Arguments:

Appellants comment as follows with respect to the Examiner's Answer dated January 28, 2004:

Appellants maintain that Ryan discloses a process for making metal-to-metal capacitors for **analog** circuits.

According to the Examiner, every capacitor necessarily forms a memory element (page 7 of Examiner's Answer). However, Leung explicitly discloses that capacitors are also used as coupling/de-coupling capacitors and as filter elements (column 1, lines 55-56). Furthermore, it is common knowledge to a person of ordinary skill in the art that together with a coil, a capacitor creates an LC-oscillator. Therefore, a capacitor does not necessarily form a memory element. It is dependent on the intended use of the capacitor whether or not it is a memory element.

Based on the above-given comments and the disclosure in column 3, lines 6-17 of Ryan, a person of ordinary skill in the art is taught that the capacitors typically used in large digital memories show variations which are not tolerable for analog circuits. Therefore, the provision of high precision capacitors for such analog circuits is explained as a main object of Ryan (column 3, lines 39-42). Accordingly, Ryan

does not pertain to the manufacture of capacitors for digital memory cells, because Ryan discloses that the problem to be solved only occurs in analog circuits.

Furthermore, two of the Examiner's comments on page 7 of the Examiner's Answer are entirely incorrect. The Examiner first states: "The appellants arguments pertaining to the capacitor of Ryan not being a memory element are however irrelevant;" and thereafter states: "it seems that the applicant is trying to read limitations into the claims or insert an intended use for capacitor, but the claims themselves do not recite any meaning other than the fact that the metal areas and the dielectric form a memory element." Appellants' argument in the Appeal brief regarding the capacitor of Ryan not being a memory element **are only** provided with respect to the combination of Ryan and Leung. It is, therefore, respectfully submitted that the Examiner's comments regarding appellants' arguments regarding Ryan not being a "memory element" should be disregarded.

Leung discloses that a capacitor that is used as a coupling/de-coupling capacitor or as a filter element (column 1, lines 51-55). Accordingly, Leung does not pertain to digital memory cell capacitors as is disclosed on page 4, lines 20-25 of the instant application. This is further supported by the disclosure in column 3, lines 46-49 of Leung,

where it is disclosed that capacitors are formed **on top** of an already **completed integrated circuit**. Contrary thereto, memory cells are formed **within** an integrated circuit and **not on top of an integrated circuit**. Moreover, the disclosure of Leung in column 11, lines 31-53, teaches that the capacitors are very large. Leung discloses that capacitors in the nF range are used and that a PZT capacitor dielectric achieved a capacity of about 30 $fF/\mu m^2$. Based on this, the calculation can be made that a 1 nF capacitor having a 30 $fF/\mu m^2$ capacitance is a square with a side length of 180 μm, which is a very large capacitor. In comparison only, at the time of filing of Leung, a digital memory cell had of 2 μm side length.

Furthermore, in column 1, lines 18-19 Leung discloses that such large capacitors are problematic because they require re-routing of the integrated circuit's interconnects. Therefore, capacitors of such size are not integrated, but instead they are provided on top of the completed integrated circuit.

Accordingly, the capacitors disclosed in Leung **cannot** be integrated into an integrated circuit. Instead, they are provided on top of already completed integrated circuits, due to the large area required for them. However, Ryan discloses that it relates to integrated circuit structures, namely to the formation of wiring and precision capacitors (column 1,

lines 7-8). Therefore, a person of ordinary skill in the art would not combine the teachings of Leung and Ryan.

Further to this, Leung discloses in column 3, lines 63-64 that the interconnects are provided underneath the capacitor. Leung discloses in column 8, lines 1-7 that after the top metallization layer is created a passivation layer is deposited. Leung discloses in column 8, lines 38-40 that the capacitor is provided on top of the passivation layer, i.e. the capacitor is provided after the top metallization layer. It is however, an object of Ryan to provide a manufacturing process, which allows **simultaneous** production of interconnects with high precision capacitors. Therefore, the teachings of Leung and Ryan conflict each other and a person of ordinary skill in the art is given no motivation to combine the teachings of Leung and Ryan.

Moreover, Ryan discloses that the capacitor is contacted from above (Fig. 3), whereas Leung discloses that the capacitor is contacted from below. This is described as the "inverted form" of the capacitor of Leung (column 8, lines 37-42). This special method of contacting the capacitor is required because the capacitor is provided on top of the integrated circuit and is not part of it. Therefore, not only are the capacitors of Ryan and Leung incompatible but also their respective ways of making contact to the capacitors are incompatible.

The contacts themselves are also incompatible since Leung requires a direct contact between the upper metal layer (134) and the lower metal layer (126) for making contact to the conductive material (124) in via (122). In contrast to this, Ryan requires a dielectric layer between the first metal layer (24) and the second metal layer (25) to prevent electromigration (column 6, lines 40-46). Because the teaching of Ryan and Leung are opposed to each other in this regard as well, a person of ordinary skill in the art cannot combine Ryan and Leung.

Finally, a person of ordinary skill in the art would not be motivated to use the teaching of Leung because the problem solved by the present invention, namely the destruction of metal layers during the process of etching contact holes, does not exist in Leung. This is because the capacitor disclosed in Leung is provided <u>on top</u> of the (filled) contact hole and is not provided below a contact hole to be etched. Accordingly, a person of ordinary skill in the art starting with Ryan and confronted with the problem of the destruction of metal layers during the etching processes cannot find any teaching regarding the solution of this problem from the teaching of Leung.

Neither Ryan nor Leung discloses capacitors or methods for manufacturing capacitors related to or used in memory cells. Furthermore, the teachings of Ryan and Leung are incompatible for above-provided reasons. Therefore, a person of ordinary skill in the art would not combine Ryan and Leung.

Moreover, as can be seen from the above-provided comments, the problem that is solved by the present invention as claimed cannot be solved by combining the teachings of Ryan and Leung, because the problem does not exist in Leung.

Based on the above given arguments the honorable Board is therefore respectfully urged to reverse the final rejection of the Primary Examiner.

Respectfully submitted,

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